From: Robert Pyke <bobpyke@attglobal.net>
To: Patrick Johnston
Sent: Thu Feb 10 11:46:44 2011
Subject: Follow-up comments to Stockton EIR scoping meeting and January Council meeting

Pat,

I missed the live presentation of the USGS on earthquakes (although I have now watched the video) and turned it on during the question and comment period. I was appalled by some of the responses that you received to good questions. As much as I like Joe Grindstaff, he was wrong when he said that DWR has no requirements for looking at earthquakes and wrong when he said "it's not something we design a levee around yet". See the first attachment for a response on the factual issues. But my concern is more that staff should not answer questions like yours when they are not in rather complete control of the facts. No-one expects the staff to be a full bottle on all these issues – their job is to connect you with people who are experts of the best kind – that is experts who not only know their own position but have some idea of its strengths and weaknesses, and also the positions of other experts. I am also attaching a draft of a guide to evaluating the relative worth of various experts opinions. I will likely submit this more formally in due course, but feel free to copy even the draft to other Council members or staff as you think is appropriate.

But much more egregious was both the invitation to the USGS to speak and the content of the USGS presentation. I am sure that Eric Nichols was well-intentioned, but anyone with even modest knowledge of this field knows that the USGS tend to grandstand and at best they should be included in a panel discussion that includes people with other views. I am one of the most severe critics of DRMS, in spite of the fact that the co-PI's are both friends – because it was schedule driven and had huge data gaps that were drawn to DWR's attention but never filled, the numerical results from DRMS should not be used – however, to provide USGS with a platform to trash DRMS was wrong. I believe that Marty McCann and Said Salah-Mars, the co-PI's, will be responding and you should listen to them.

Briefly, what was wrong with the presentation is that most of it was showboating – those guys must really be worried about the Republicans cutting their budget – and they were wrong on at least two key issues. The showboating included showing examples of levees failures that are largely irrelevant to the Delta. I happen to be very familiar with Christchurch, New Zealand, for instance. It is the only place in the world where I have ever been an expert witness on the losing side of a lawsuit. The levees that deformed or "failed" there sat directly on top of very recent and loose sand deposits. The natural sand deposits that some people worry about liquefying in the Delta are under the peat and thus much older – but perhaps I am getting too technical. Joe's Fletcher citing of amplifications of ground motion by a factor of 40 in the Mexico City earthquake was pure scare tactics. We know why such amplifications occurred in Mexico City and why they will not happen in the Delta. The fields of study of the effects of soils on ground motions, like the response of levees to earthquake shaking, is part of geotechnical engineering, and wiser geologists acknowledge this. These fields of study happens to have been largely developed by the late Professor Harry Seed, my mentor and Ray's father, it is one in which I am a recognized national and international expert, and it is painful to see you being subjected to this kind of grandstanding.

Marty and Said will likely elaborate on the major criticism made by USGS of DRMS which was that only firm soil attenuation relationships were used. It is true that the section of the DRMS report that deals with seismic risk to the levee system runs some 270 pages so not many people have actually read it, but if you do read it, it is clear that as a first, logical step, DRMS used firm soil attenuation relationships, but then in a second step they conducted both equivalent linear and nonlinear analyses of the response of the local soil conditions and levees. It may well be true that the activity of the Greenville fault may now be thought to be greater than it was even a few years back, but that still does not make a dramatic difference to the seismic hazard in the Delta, and it is outrageous for Dave Schwartz, also a friend, to say that prior studies, meaning DRMS, made "very, very unrealistic" assumptions. I first read that in a newspaper report and could not believe that he had said it, but on checking the video I find that he did. Well, one less Christmas card to send! Dave's less than accurate comment on the relative difficulty of designing levees and buildings for earthquakes is also addressed in the first attachment.

I don't know whether it is reassuring or alarming that Tom Zuckerman, a retired lawyer and gentleman farmer, should be more balanced, objective and accurate than the three Ph.D.'s from USGS. His son Brian is a very good engineer so maybe he acquired his skill not by osmosis but by reverse osmosis or reverse hereditary? Anyway,

Tom is an exception to my second attachment. Gil Cosio is not, but you should also listen to Gil and not just because he would score highly on my ranking system. You should listen to Tom and Gil because they make sense – they say things that are consistent with reality.

As a heads up, I am also attaching a draft copy of my suggested policy for Delta levees which I referred to in my remarks to you in the Stockton fog in an attempt to show that balanced approaches to some of these problems are possible. It is supposed to be somewhere in between the sky is falling in and head in the clouds. Like many other people I am holding off making a more formal submission until we see what, if anything, your staff and consultants come up with in the first and second drafts of your Plan. Not because we want to ambush anyone – well, I can't speak for everyone on that – but because it should be more constructive to comment once we see whether they provide any real content – at least a good straw man. As I said in Stockton, I am not optimistic that they will. I mention this now because it is related both to the issue that I started on – how does the Council get balanced advice on all these complex issues – and the point that Phil makes repeatedly, and that was picked up by Alex Breitler in his report of the Stockton meeting, which I also address in the first attachment – paraphrased, that people tend to be anchored to what they already believe.

Regardless, I wish you well.

Bob

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I note that USGS have now backpedalled on the criticisms of DRMS in their letter to the Council dated February 4, 2011. rmp

Welcome back!

I want to second your commendations to Sarah Langford of ACWA and Alex Breitler of the Stockton Record under your first bullet. Both pieces are relatively straightforward reports, as is Sarah's subsequent report of the second day of the Delta Stewardship Council meeting. However, Sarah's subsequent report http://www.acwa.com/news/delta/delta-stressors-seismic-risks-focus-delta-stewardship-council-meeting, that covers the ISB report on stressors and USGS comments on earthquake risk, contains an apparently innocuous quote from Dave Schwartz, an old friend, who said: "We are less sophisticated at retrofitting levees for earthquake risks as we are at retrofitting buildings". My problem here is that that is just not true. I'll explain why I say that in a moment, but my reason for writing is primarily to point out the difficulty of sustaining intelligent public debate on these somewhat technical issues. I recently had a long debate by e-mail with Paul Tullis, who had a well-researched and well-written article on Delta issues in Miller-McCune. Paul, understandably in many ways, had highlighted the most quotable quotes from people on either side of the argument - the most quotable, not the most accurate, rational or helpful. I suggested that he should do a follow-up article exploring the biases of the people that he had quoted, but he said that he did not think that he could sell that to his editors.

In Alex's report of this same meeting he includes a quote from Phil Isenberg, the chairman of the Council, which speaks to this same issue: "Everybody is remarkably capable of determining something should or should not be done based on their own previously determined policy positions". Phil is not far off the mark, but a one size hat does not necessarily fit all heads in this instance. Most people who choose to speak in public are posturing and prejudiced to some extent, but not everyone, or at least not everyone to the same extent. So, here is my question: how can a layperson decide the merits of opposing views put forth by different, apparently well-qualified experts?

Disclaimer: I already have a draft of an article on this subject and I will pirate any useful suggestions!

Footnote: my problem with the quote from Dave Schwartz is actually two-fold. One problem is that, although he is an unusually well qualified and able tectonic geologist, our relative ability to retrofit buildings and levees is an engineering question, not a geologic question. The second problem is that the assertion is just not correct. Nor was Joe Grindstaff's comment, reported by Matt Weiser in the Sacramento Bee, that : "We have no earthquake standard for levees in the state, it's not something we design a levee around yet." It is true that DWR has been slow to develop procedures for analyzing the earthquake hazard to levees and in drawing up standards, but the DWR Urban Levee Evaluation includes consideration of earthquake shaking and so does the recently

released 4th draft of the DWR Interim Levee Design Criteria. While specifically for urban levees, these criteria address what are called “non-intermittent” levees, i.e. Delta levees and constitute a useful step towards developing appropriate standards for Delta levees. Otherwise, in addition to working on both Delta and riverine levees, including serving as an expert witness in the Paterno Case, I have worked on evaluating the earthquake hazard to levees around San Francisco and San Pablo bays since at least 1977. These levees protect both homes and landfills that contain varying amounts of toxic waste. Neither BCDC, nor the multiple agencies that regulate landfills, will accept even low probabilities of failure of these levees. As to whether it is easier to retrofit a levee or a building structure, as someone who has also worked on the BART seismic retrofit and the design of the new East Bay Bridge, as well as a number of school and hospital buildings, I will assert that making a levee robust to withstand earthquake shaking is a lot simpler than retrofitting or even designing a new building or bridge structure to be robust. Basically it just takes a wider cross-section and more dirt. Oh, you say, the test was sophistication. Well, we can do very sophisticated nonlinear analyses of levees and their foundations, given time and money - in some ways more sophisticated than most seismic analyses of buildings and bridges. But the point is more that they are not generally necessary because the design of a levee is simpler and more common-sensical.

A Layperson's Guide to Weighting Expert Opinion

by Robert Pyke Ph.D.

In the first place use common-sense – spot check some facts where possible – ask around and get multiple recommendations. But then, in approximate order of importance, give more weight to the opinions of those experts:

1. Who have formal qualifications and are licensed to practice in the field in question; for example, my brother is professor of law in Brisbane Australia – he is a pretty smart guy and a quick study so he might quickly be able to make some sage comments on California water law, but you would hardly want to rely on his opinion alone and he could not represent you in court.

2. Who have practical experience not only in the field in question but in the relevant geographic area. This is particularly important in a field like engineering which is still as much an art as a science. Experience and common-sense still outweigh the ability to do sophisticated calculations. All other things being equal, preference should be given to the opinions of people who have actually signed design drawings and stood behind (or in front of) their work.

3. Who have superior academic qualifications. All other things being equal, higher degrees count. I would be the first to admit that a Ph.D. does not necessarily mean a heck of a lot and in some cases it is an indication of lack of common-sense, but it is an indication that you have the ability to study something in detail, and if the person in question has kept up in his/her field, that provides an understanding of what it takes to stay up to date in other fields.

4. Who are *not* trying to dredge up additional research funding by grandstanding and making problems appear to be worse than they really are.

5. Who demonstrate some measure of humility rather than hubris. It is possible for people who are showboats to also have real knowledge and talent, but people who like to hear themselves talk are, more often than not, not the best listeners.

An Outline of a Rational Policy for Delta Levees

By Robert Pyke, Ph.D, G.E.

Preamble: The historic Delta has been modified by the creation of islands surrounded by levees. The following points assume that this configuration will be largely preserved, partly to protect the existing infrastructure, including water conveyance, and partly to maintain the Delta as a Place. While some evolution in uses is likely, significant changes in the geometry of the Delta islands is unlikely. The failure of Delta levees and the creation of open water within the Delta will not restore the historic condition and is undesirable for a number of reasons. Restoration of some measure of complexity to the Delta waterways is desirable but this can best be accomplished by recovering the sunken islands, not as farmed islands but as tidal wetlands, by encouraging the growth of native vegetation on the water side of all the levees and perhaps adding water side benches, and possibly by restricting the flows in selected channels.

1. Opinions vary as to the current condition of the delta levees but these differences are exaggerated in public discussion as a result of posturing by one side or another. In private discussions there is not much difference between me, for instance, an optimist, and Jeff Mount and Ray Seed, the doomsday twins.

2. Dave Mraz of DWR gave a very good summary at an early meeting of the Delta Stewardship Council of the current status of the Delta levees: (i) the levees hold back water every day so that their static stability and seepage control measures are pretty good; (ii) "sunny day failures" are still a problem but the likelihood of these failures can be minimized by better monitoring; (iii) earthquake-induced failures are a legitimate concern but opinions vary on how great the hazard really is and more precise evaluations are hampered by a lack of data (paraphrased).

3. The DRMS study is not a good basis for drawing any numerical conclusions because it was schedule-driven and hampered by big data gaps.

4. My own opinion is that with continuing improvements funded by the State's subventions program and the $200m that is being made available by the Federal government through the Corps of Engineers, the Delta levees are, or will be, in not such bad shape for flood and earthquake loadings with a 100 year return period.

5. However, given the importance of the levees for maintaining the Delta as a place and protecting the vital infrastructure that runs through it, designing for a 100 year return period is inadequate. Critical structures in this state like schools and hospitals are designed for something like a 1000 year return period. The new East Bay Bridge, which is a critical structure, but no more critical than many of the Delta levees, was designed for 1500 year return period ground motions. On balance, design for flood and earthquake loadings with return periods in the order of 500 years would appear to be appropriate. This corresponds to higher probabilities of failure than are used for instance in the Netherlands, but the economics and politics are different in the Netherlands and they really don't meet their stated criteria anyway!

6. It is feasible to design for 500-year return period loadings by widening the existing levees on the land side as shown by the "super levees" designed for Delta Wetlands. Such levees can be constructed at a cost which might be in the order of $5-8m per mile. These levees can also easily be raised as necessary to accommodate sea level rise.

7. A critical component of the ecosystem restoration element of the Delta Plan should be the restoration of native vegetation on the water side of every Delta levee. This might require the installation of an engineered rodent and root barrier but can otherwise be easily accommodated by using a more substantial levee section.

8. Other levee standards are not applicable to the Delta and the Delta Plan should include a Delta-specific levee standard. This standard should require advanced monitoring for defects and real-time alerts of deformation or failure.

9. Both Jeff Mount and Bob Bea are calling for wider use of risk- based approaches for dealing with the Delta levees. That is fine in theory, and an updated risk assessment might be a good way to prioritize spending on Delta levees, but it should be recognized that there are significant uncertainties in such analyses and that they cannot be used directly for design purposes. Common-sense rules, such as giving priority to the islands in the Western Delta are likely to be just as, or more useful.

10. The cost of the required improvements is manageable relative to the value of the infrastructure that passes through the Delta (including water conveyance) and the cost of relocating this infrastructure. There is a relatively simple path to financing such super levees as outlined in my recent remarks to the Contra Costa Council Water Task Force.